GUTTA PERCHA:

ITS

DISCOVERY, PROPERTIES,

CAPABILITIES AND USES.

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John Thornly
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A BRIEF ACCOUNT

OF

THE DISCOVERY, PROPERTIES, &c.

OF

GUTTA PERCHA.

Gutta Percha, from the moment of its introduction into this country, as an article of manufacture, has excited a steadily growing curiosity in the public mind to know something of its history, its nature and capabilities. It is now felt by the American Gutta Percha Company to be time to satisfy, in some degree, this curiosity. To this end the few following pages will be devoted; and in what will be said, the aim will be to give a succinct and reliable account of this article.

Discovery of Gutta Percha.

Gutta Percha, like many other of the most valuable substances and agents in nature, was discovered by accident. The merit of the discovery is due to Dr. W. Montgomerie, of England. He received, in 1845, the gold medal of the Society of Arts in London, for his valuable service in introducing it to the British Public.

As far back as 1822, when on duty at Singapore as assistant-surgeon to the Residency, he accidentally heard the name of the substance, and was led to make some in-

quiries concerning it; but it was not till 1842 that he met with any success. While at Singapore he observed on one occasion, in the hands of a Malayan woodsman, the handle of a *parang* made of a material quite new to him, and which appeared to be very different from Caoutchouc, to which his attention had hitherto been mainly directed. On inquiry he found that it was made of a substance which the natives called Gutta Percha. Having subjected it to experiment, he speedily discovered many of its valuable properties; and at once concluded that if procurable in large quantities, it would become extensively useful, and would in a great degree supplant the use of Caoutchouc. This conclusion induced him to forward specimens of the Gutta Percha to the Asiatic Society of Bengal, and to the Society of Arts in London.

When Dr. Montgomerie made his inquiries in 1842, this substance was quite unknown to the people at Malacca and Sumatra. The Gutta Percha tree grows abundantly in the island of Singapore and in the dense forests at the extremity of the Malayan Peninsula; also in Sarawak, and probably all over the island of Borneo. The tree is one of the largest found in the eastern forests: its wood is seldom used, but an edible oil is procurable from the fruit, which the natives use with their food.

Properties of Gutta Percha.

The name is purely Malayan, "*gutta*," meaning the gum or concrete juice of a plant, and "*percha*," the particular tree from which this is procured. The *ch* is not pronounced hard like a *k*, but like the *ch* in the English name of the fish, *perch*. Gutta Percha is imported in oblong masses, which are formed by rolling thin layers of it together in a soft state. As imported, owing to the careless manner in

which it is collected, it is mixed with fragments of bark, wood, leaves and other impurities; but when pure it is in thin slices, semi-transparent, excessively tough, having much the appearance of horn.

At ordinary temperatures it is non-elastic, and as hard as wood. At an elevated temperature it becomes slightly elastic. From 200 to 212 Fahrenheit, it is rendered excessively ductile, and in this condition may be worked into any form, which it retains without contraction after cooling, when it again acquires its original hardness. The Gutta Percha is soluble, but not by the same agents as India Rubber. The fixed oils and indeed all unctuous substances have no influence upon it. This property renders it very valuable for purposes of machinery, where, when used for driving bands, as it is most extensively, it is constantly brought in contact with oils and grease.

Some have entertained the erroneous impression that the Gutta Percha is quite the same as Caoutchouc, whereas it differs from it in every important particular, and is capable of a vastly wider application in all the useful and ornamental arts. Gutta Percha will not, like Caoutchouc, after being extended, return to its original size. The action of boiling water upon all the specimens of India Rubber, even the non-elastic varieties, is to soften the mass and to render it so extremely adhesive that it is impossible to work it into any permanent shape whatever. The Caoutchouc remains in this viscid state for some time, when it hardens and becomes pliable. On the contrary, the Gutta Percha when softened by the action of boiling water, exhibits no stickiness, and can in this state be rolled out into the thinnest sheets, and on exposure to a cooler temperature, it regains its original toughness and flexibility.

The Capabilities

Of Gutta Percha in the useful and ornamental arts are unbounded. There is no conceivable limit to its application. Scarce a day elapses but some new modes of employing it are discovered by those engaged in its manufacture. Things of strength, things of utility, things of safety, things of beauty, all come within its range. The utmost surprise and gratification have been uniformly expressed by those who have examined the, as yet, but partially exhibited result of the labors of the American Gutta Percha Company.

All concur in the opinion, that the Public may look forward to a time not far distant, when this substance will, from its cheapness, its durability, and the facility with which it may be worked, vastly multiply the comforts of life, and bring within the reach of the man of taste, however limited his means, forms of elegance and fac similes of the productions of genius, which it would not otherwise be possible for him to enjoy.

In addition to the numerous useful and important applications of the Gutta Percha, it may be manufactured by "moulding, stamping, embossing, casting, or any other known process or processes, into various articles of use; as glass and picture frames, cornices, mouldings and other architectural ornaments, pannelling, mosaics, &c," in a word, it may be worked into any form, and almost any color may be given, from the simplest to the most complex. Cornices of the most elaborate designs, in imitation of several kinds of wood, are manufactured of it; and from the toughness of the material, even the most delicate representations of foliage are not liable to injury. Copies of old oak paneling taken in the Gutta Percha, have preserved every trace of the original; the grain of the wood, its abrasion by age, its color and pattern, and all with the utmost fidelity. Im-

pressions taken from coins and medallions are really beautiful; and statues may be copied by it with great truth and at a comparatively small cost. But fully to describe its capabilities, would be to quote at length the specifications of the numerous Patents by which its manufacture is guaranteed to the American Gutta Percha Company.

Having remarked upon the discovery, the properties and capabilities of Gutta Percha, it may be well to say something relative to the history of its introduction as an article of manufacture into England and this country. This is felt to be the more necessary from the fact that attempts have been made on this side of the Atlantic to mislead the Public.

Gutta Percha was first introduced into England for purposes of manufacture, by Richard Archibald Brooman, of London. To him letters Patent were granted for some of its applications in 1844 and 1845. Others were granted May 20th, 1845, to Christopher Nickles, for its application to book-binding, &c. May 29th, 1845, Letters Patent were granted to Charles Keene of London, for its application to boots, shoes, hats and all articles of wearing apparel. September 4th, 1846, Letters Patent were granted to a Quaker of Dublin, by the name of Bewley, for its application to the manufacture of flexible syringes, tubes, bottles, hose and articles of a similar description. Three Letters Patent, dated January 12th, 1846, May 15th, 1846, and February 15th, 1847, were granted to Charles Hancock, of London, for the manufacture of machine bands, cords, &c. For the first two years, (1845 and 1847,) after the introduction of Gutta Percha as an article of commerce and manufacture, it was confined to England. This will occasion no surprise, when we consider the shrewdness, the energy and enterprise with which the article was managed by the English Patentees. As soon as it was discovered that Gutta Percha had any value for manufacturing purpo-

ses, the Dublin Quaker and others purchased all the patents in England, formed a gigantic company, enlisting in it many members of the East India Company, and at once commenced the manufacture of Gutta Percha in all its branches. This Company immediately applied for Letters Patent in France, Germany and the United States. So that scarce had the name of the article reached the public ear, before a vast monopoly, with one of the richest banking houses in England at its head, was formed. This rapidity of movement and abundance of capital were necessary to secure the end the Company had in view; namely, to monopolize not only the manufacture of Gutta Percha, but also the raw material. For this purpose they established their agencies at *Singapore*, and, in connection with the East India Company, planted them along the entire length of the Malayan coast. All this was accomplished ere a word reached this side of the Atlantic. To this statement there is one exception; for as early as May, 1846, William S. Wetmore, Esq. an eminent merchant of the City of New-York, received from one of his agents at Singapore a few bundles of whips made by the natives of that country. Always distinguished for sagacity and enterprise in his business movements, this gentleman became at once exceedingly anxious to know more of this substance. Himself a pioneer of the island of Borneo, and well acquainted with the resources of that and the neighboring islands, he immediately ordered his agents to purchase the raw material and ship it to the United States.

In the summer of 1846 Samuel T. Armstrong, of New-York city, well known for his numerous and important contributions to the useful arts, received from one of the Directors of the East India Company specimens of Gutta Percha, in its crude and manufactured state, with an invitation to visit London, for the purpose of effecting some ar-

rangement with that Company, by which the article might be introduced into the United States. Owing to engagements entered into with the American government Mr. A. could not leave for London till the month of March, 1847. He arrived in England about the first of April; visited all the Gutta Percha manufactories there and on the Continent, and finally made arrangements for the purchase of the patents granted by, or to be granted by, the United States to Brooman, Hancock, Bewley, Keene and Nickle. He also effected an arrangement with the mammoth manopoly in London for a supply of the raw material, well knowing that without such an arrangement it would be impossible for any man, or set of men, to undertake, with a prospect of success, the manufacture of Gutta Percha in this country. Mr. Armstrong returned to the United States in the fall of 1847, and immediately applied himself to the construction of the necessary machinery. This being accomplished, he at once began the manufacture of Gutta Percha in all its most important branches. The first intimation which reached the public of the manufacture of Gutta Percha in the United States, was the announcement of the arrival of an invoice of Gutta Percha from London, consigned to S. T. Armstrong. From these facts it will be seen, that Mr. A. was the earliest importer of Gutta Percha, as an article of commerce and manufacture, into the port of New-York, and the first manufacturer of the article in the United States. The first Gutta Percha belt used in this country on machinery was sold by Mr. Armstrong to Messrs. Corning, Horner and Co. to be used on machinery run by them at Sing Sing, N. Y. This Company at once saw the value and superiority of the article, and, with their customary promptness in business matters, immediately introduced it into their factories. The bands were then introduced at the Allaire works, by James P. Allaire, one of our most enter-

prising steamboiler manufacturers. They were next used in the Secor works. The business has thus far outrun the most sanguine expectations of its projector, and has advanced so rapidly as now to require an enlargement of the original basis of operations. Its capabilities of application to so many of the staple articles of our country, aside from its employment in the department of the ornamental arts, gives to its manufacture an almost boundless extent. Something may be judged of the truth of this statement by running the eye over the following list of articles, which by no means exhausts the range of Gutta Percha:

Machine Belts and Bands,
Gas Pipes and Water Pipes,
Speaking Pipes,
The Insulating of Telegraph Wires,
Saddles and Harness of all kinds,
Trays, Fancy Boxes, Tables,
Pumps, Boxes, and Valves,
Book-binding, Vellum, Balls,
Water-Proof Roofing,
Inkstands, Drinking-cups,
Canes, Whips, Flasks,
Hats, Caps, Boots, Shoes,
Clothing, Decorations for Houses and Ship Cabins,
Chairs, Lining for Bread Casks for sea voyages,
Air-tight Coffins,
Linings for Water Tanks,
Powder Kegs, for the transportation of Powder in water,
Soda Fountains, Gasometers,
Bottles, Pictures, and Looking-glass Frames.

It also recommends itself to the attention of the medical faculty; and as scientific persons give the subject the attention that humanity demands, it will be found to possess valuable properties, superior for many purposes to any other substance. It has already been approved for bougies, catheters, stethoscopes, nipple-shells, bandages, and splints. This latter article is invaluable from the facility with which it adapts itself, when made plastic in boiling water, to the

form of the limb; for preserving the strength of medicines of a volatile nature, and in the application of galvanism or electricity to the healing art, it can be made a valuable agent, being a perfect non-conductor. For marine and national purposes, the field is most extensive; as an inside sheathing for ships, for buoys, and beacons, it is supposed to resist for all time the vermin that is so destructive in southern waters. Army and navy equipments, canvass, deck covers, car-covers, sails and rigging, are rendered impervious to water and dampness, preventing mildew and rot. It is of a light color, and not injured by climate or a tropical sun. For cannon covers, water tanks, *life-boats*, and many other applications, it is destined to supercede metal and India Rubber. It will also be found superior to glue in its adhesive properties, and to the gums generally, as a basis for various varnishes, sizings and paints, being weather-proof and not liable to crack.

The manufacture of all these and similar articles is covered by Letters Patent, granted by the government of the United States. The business is carried on by S. T. Armstrong, Esq. under the name of the *American Gutta Percha Company*. The capital already invested, though amounting to nearly fifty thousand dollars, is far from being adequate. It will be increased during the present season to one hundred and fifty or two hundred thousand dollars; and then it will be insufficient to meet the growing demand for Gutta Percha goods. Nothing short of the establishment of factories in every state, similar to the one now in operation, can meet its demand.

There can be no doubt but its introduction into this country ought to be regarded as a boon of the highest value, for it will most effectually aid in the promotion of many of the arts of utility, and contribute in no small degree to the advancement of those which are from their refined charac-

ter to be ranked among the intellectual manifestations of the age. *Liebig* has said, that the rapid advance of organic chemistry has been due to the introduction of sheet Caoutchouc. If so, why may not it and other sciences be advanced by the use of material which is, in many respects, superior to India Rubber, and which can be employed where that fails.

EXTRACTS FROM SILLIMANS' JOURNAL.

Gutta Percha; by THOMAS OXLEY, Esq. A. B. Senior Surgeon of the Settlement of Prince of Wales' Island, Singapore, and Malacca, (Journ. Ind. Archip., Singapore, No. 1, 1847, p. 22.)—The gutta percha tree, or gutta túban as it ought more properly to be called,—the percha producing a spurious article,—belongs to the natural family Sapoteæ, but differs so much from all described genera, having alliance with both Achras and Bassia, but differing in some essentials from both, that I am disposed to think it is entitled to rank as a new genus. I shall therefore endeavor to give its general character, leaving the honor of naming it to some more competent botanist, especially as I have not quite satisfied myself regarding the stamens from want of specimens for observations.

The tree is of large size, from sixty to seventy feet in height, and from two to three feet in diameter. Its general appearance resembles the genus Durio, or well known Dooiian, so much so as to strike the most superficial observer. The under surface of the leaf, however, is of a more reddish and decided brown than in the Durio, and the shape is somewhat different. The flowers are axillary, from one to three in the axils, supported on short curved pedicles, and

numerous along the extremities of the branches. Calyx, inferior, persistent, coriaceous, of a brown color, divided into six sepals which are arranged in double series. Corolla, monopetalous hypogenous, divided like the calyx into six acuminate segments. Stamens, inserted in the throat of the corolla, in a single series, variable in number, but, to the best of my observation, the normal number is twelve, most generally all fertile, anthers supported on slender bent filaments, opening by two lateral pores. Ovary, superior, terminated by a long simple style, six celled, each cell containing one seed. Leaves about four inches in length, perfect, entire, of a coriaceous consistence, alternate, obovate lanceolate, upper surface of a pale green, under surface covered with close, short, reddish brown hairs. Midrib projects a little, forming a small process or beak.

Every exertion of myself and several others have failed in procuring a specimen of the fruit of the gutta, I regret being compelled to omit the description of it in the present instance, but hope to rectify this omission in some future number of the Journal. It is quite extraordinary how difficult it is to obtain specimens of either the flower or fruit of this tree, and this is probably the reason of its not having been earlier recognized and described by some of the many botanists who have visited these parts.

Only a short time ago the túban tree was tolerably abundant on the Island of Singapore, but already all the large timber has been felled, and few, if any, other than small plants are now to be found. The range of its growth, however, appears to be considerable; it being found up all the Malayan Peninsula as far as Penang, where I have ascertained it to be abundant; although as yet the inhabitants do not seem to be aware of the fact: several of the mercantile houses there having sent down orders to Singapore for supplies of the article, when they have the means of

supply close at hand. The tree is also found in Borneo, and I have little doubt it is to be found in most of the Islands adjacent.

The localities it particularly likes are the alluvial tracts along the foot of hills, where it flourishes luxuriantly, forming, in many spots, the principal portion of the jungle. But notwithstanding the indigenous character of the tree, its apparent abundance, and wide spread diffusion, the gutta will soon become a very scarce article, if some more provident means be not adopted in its collection than that at present in use by the Malays and Chinese.

The mode in which the natives obtain the gutta is by cutting down the trees of full growth and ringing the bark at distances of about twelve to eighteen inches apart, and placing a cocoanut shell, spathe of a palm, or such like receptacle, under the fallen trunk to receive the milky sap that immediately exudes upon every fresh incision. This sap is collected in bamboos, taken to their houses, and boiled in order to drive off the watery particles and inspissate it to the consistence it finally assumes. Although the process of boiling appears necessary when the gutta is collected in large quantity, if a tree be freshly wounded, a small quantity allowed to exude, and it be collected and moulded in the hand, it will consolidate perfectly in a few minutes, and have all the appearance of the prepared article.

When it is quite pure the color is of a greyish white, but as brought to market it is more ordinarily found of a reddish hue, arising from chips of bark that fall into the sap in the act of making the incisions, and which yield their color to it. Besides the accidental chips, there is a great deal of intentional adulteration by sawdust and other materials. Some specimens I have lately seen brought to market, could not have contained much less than one-fourth of impurities; and even in the purest specimens I could

obtain for surgical purposes, one pound of the substance yielded, on being cleaned, one ounce of impurities. Fortunately it is neither difficult to detect or clean the gutta of foreign matter; it being only necessary to boil it in water, until well softened, roll out the substance into thin sheets, and then pick out all impurities, which is easily done, as the gutta does not adhere to any thing, and all foreign matter is merely entangled in its fibres, not incorporated in its substance. The quantity of solid gutta obtained from each tree varies from five to twenty catties,* so that, taking the average at ten catties, which is a tolerably liberal one, it will require the destruction of ten trees to produce one picul.† Now the quantity exported from Singapore to Great Britain and the continent from 1st January, 1845, to the present date, amounts to 6,918 piculs, to obtain which, sixty-nine thousand one hundred and eighty trees must have been sacrificed. How much better would it therefore be to adopt the method of tapping the tree, practiced by the Burmese in obtaining the Caoutchouc from the Ficus elastica, (viz. to make oblique incisions in the bark, placing theb amboos to receive the sap, which runs out freely,) than to kill the goose in the manner they are at present doing. True, they would not at first get so much from a single tree, but the ultimate gain would be incalculable, particularly as the tree appears to be one of slow growth, by no means so rapid as the Ficus elastica.‡

Properties of the Gutta.—This substance when fresh and pure is, as already mentioned, of a dirty white color

* A Cattie is one and one-third pounds.

† A Picul weighs 133⅓ pounds, or 100 catties.

‡ The English company have employed agents to instruct the natives as to the best method of collecting the sap, and we are told that the practice of cutting down the trees has been generally abandoned.

and a greasy feel, with a peculiar leathery smell. It is not affected by boiling alcohol, but dissolves readily in boiling spirits of turpentine, also in naptha and coal tar. A good cement for luting bottles and other purposes is formed by boiling together equal parts of gutta, coal tar and resin. I am indebted for this hint to Mr. Little, surgeon, and the above were his proportions. I have, however, found it necessary to put two parts of the gutta, that is one-half instead of one-third, to enable the cement to stand the heat of this climate. When required for use it can always be made plastic by putting the pot containing it over the fire for a few minutes. The gutta itself is highly inflammable, a strip cut off takes light, and burns with a bright flame, emitting sparks, and dropping a black residuum in the manner of sealing wax, which in its combustion it very much resembles. But the great peculiarity of this substance, and that which makes it so eminently useful for many purposes, is the effect of boiling water upon it. When immersed for a few minutes in water above 150° Fah., it becomes soft and plastic, so as to be capable of being moulded to any required shape or form, which it retains upon cooling. If a strip of it be cut off and plunged into boiling water, it contracts in size both in length and breadth. This is a very anomalous and remarkable phenomenon, apparently opposed to all the laws of heat.

It is this plasticity when plunged into boiling water that has allowed of its being applied to so many useful purposes, and which first induced some Malays to fabricate it into whips, which were brought into town and led to its farther notice. The natives have subsequently extended their manufactures to buckets, basins and jugs, shoes, traces, vessels for cooling wine, and several other domestic uses; but the number of patents lately taken out for the manufacture of the article in England proves how much at-

tention it has already attracted, and how extensively useful it is likely to become. Of all the purposes, however, to which it may be adapted, none is so valuable as its applicability to the practice of surgery. Here it becomes one of the most useful auxiliaries to that branch of the healing art, which of all is the least conjectural. Its easy plasticity and power of retaining any shape given to it when cool, at once pointed it out as suitable for the manufacture of Bougies, and accordingly my predecessor, Dr. W. Montgomerie, availed himself of this, made several of the above instruments, and recommended the use of it to the Bengal Medical Board. But, like many other good hints, for want of sufficient inquiry, I fear it was disregarded. The practice, however, has been continued by me, and I find many advantages in the use of this substance. It also answers very well for the tubes of syringes, which are always getting out of order in this country when made of Caoutchouc. But my late experiments have given it a much higher value, and proved it the best and easiest application ever yet discovered in the management of fractures, combining ease and comfort to the patient, and very much lessening the trouble of the surgeon. When I think of the farago of bandages and splints got rid of, the lightness and simplicity of the application, the gutta would be no trifling boon to mankind were it to be used solely for this and no other purpose. The injuries coming under my observation, wherein I have tested its utility, have, as yet, only been two compound fractures of the leg, and one of the jaw. But so admirably has it not only answered, but exceeded my expectations, that I should think myself culpable in not giving the facts early publicity. Its utility in fracture of the lower jaw must at once strike any surgeon. So well does it mould itself to every sinuosity, that it is more like giving the patient a new bone than a mere support. A man lately

brought into the hospital, who had his lower jaw broken by the kick of a horse, and which was so severe as to cause hemorrhage from the ears, smashing the bone into several fragments, was able to eat and speak in three days after the accident, and felt so well with his gutta splint that he insisted on leaving the hospital within ten days. My mode of applying this substance to the fracture of the leg is as follows:

The gutta having been previously rolled out into sheets of convenient size, and about one-fourth of an inch in thickness, is thus kept ready for use. When required, a piece of the necessary length and breadth is plunged into a tub of boiling water. The limb of the patient is then gently raised by assistants, making extension in the usual manner. The surgeon, having ascertained that the broken bone is in its place, takes the sheet of gutta out of the hot water, and allows it to cool for a couple of minutes. It is still soft and pliable as wash leather. Place it whilst in this state under the limb, and gently lower the latter down on it. The gutta is then to be brought round and moulded carefully to the whole of the back and sides of the leg, bringing the edges close together, but not uniting them. If there be any superfluous substance it can be cut off with a scissors, leaving an open slit down the front of the leg. You have now the leg in a comfortable, soft, and smooth case, which, in ten minutes, will be stiff enough to retain any shape the surgeon may have given it, and which will also retain the bone in place. Place the leg so done up on a double inclined plane, and secure it thereto by passing three of the common loop bandages around the whole,—that is, one at the top, one in the middle, and one at the lower end. Let the foot be supported by a foot board, and a case of gutta put over the dorsum of the foot, to bear off the pressure of the small bandages generally used to secure it to the board. Having done this,

the surgeon need not cause his patient another twinge of pain until he thinks he can use the leg, or he deems the bone sufficiently united to bear the weight of his patient. If it be a compound fracture it will only be necessary to unite the loop bandages, separate the edges of the gutta splint to the required distance, wash and cleanse the limb without shifting any thing except the dressings, and having done so, shut it up again. The most perfect cleanliness can be maintained, as the gutta is not affected by any amount of ablution; neither is it soiled or rendered offensive by any discharge, all which washes off as easily from the gutta case as from oil cloth. I have had a patient where the tibia protruded through the integuments fully two inches, walking about in six weeks from the injury, with the leg as straight and well formed as it ever had been. It is quite obvious therefore that if it answers so well for compound, it will answer equally, if not better, for simple fractures; and that any broken bone capable of receiving mechanical support can be supported by the gutta better than by any other contrivance. For it combines lightness and smoothness, durability and a capability of adjustment, not possessed by any other known substance. All new experiments have to run the gauntlet of opposition, and I do not suppose that these recommendations will prove an exception to the rule; but all I ask of any surgeon is to try the experiment ere he argues on its propriety, and I feel fully convinced that all other splints and bandages will be consigned to the tomb of the capulets. There are some other uses for which I have tried this substance, viz. as capsules for the transmission of the vaccine virus, which ought to keep well when thus protected, for it is most perfectly and hermetically sealed. But I have not had sufficient experience in this mode of using it to pronounce decidedly on its merits. I am at present trying the effects of it on ulcers, by enclosing the ulce-

rated limb in a case of gutta so as to exclude all atmospheric air, and, so far the experiment promises success.

Since writing the foregoing observations I have had an official intimation from Penang of the vaccine virus transmitted in the gutta capsules having been received in good order, and of its having succeeded most satisfactorily. I have also opened a capsule containing a vaccine crust that had been kept here for one month, and it also seems to have lost none of its efficacy, as the case inoculated has taken. This will appear the more striking when it is recollected that to preserve the vaccine virus hitherto in Singapore, even for a few days, has been almost impossible,—that this settlement, notwithstanding every exertion on the part of both private and public practitioners, has been without the benefit of this important prophylactic for an interval sometimes of two years,—and that, at all times, the obtaining and transmitting this desirable remedy has been a cause of trouble and difficulty to all the medical officers I have ever met with in the straits.

"The interesting electrical property of Gutta Percha, first noticed by Faraday, is truly wonderful.

"A piece of the manufactured thin sheet gum cannot be taken from a paper in which it has been wrapped, without exhibiting this remarkable property, and by gentle friction with a silk handkerchief a spark is readily obtained from it of an inch in length.

"From the excellent non-conducting power of Gutta Percha, it is likely to come into extensive use in the manufacture of electrical apparatus, and it has already been employed to some extent for insulating the wires of the electric magnetic telegraph."

From the Albion of September, 1848.

GUTTA PERCHA.

At the meeting above alluded to, Mr. Whishaw read a paper giving an explanation of the various applications of Gutta Percha; numerous specimens of which, in the shape of thread, cord, tabular staves, driving bands, constables' staves, sticks, whips, inkstands, medallions, shields, water buckets, stereotype plates, and almost every other description of article, both useful and ornamental, were present. The paper, after stating that gutta percha was the concrete juice of a large tree of the same name, abounding in Borneo, &c. obtained by tapping the tree periodically by the Malays, stated that its introduction into this country was purely accidental; Dr. Montgomery having transmitted the first sample of it to the Society of Arts, in 1843, at which time he (Mr. Whishaw) was secretary to that Society. The first articles of use made of gutta percha in this country were laid before the Society of Arts in 1844, and consisted of a lathe-band, a short length of pipe, and a bottle-case, which he had himself made by hand, having caused the concrete substance to become sufficiently plastic by immersing it in hot water. He also produced casts from medals, which attracted considerable attention at the time, and surgical instruments were soon after made of this new material. It was also adapted to commercial uses; and from the period mentioned to July 11, in the present year, between 600 and 700 tons had been imported for the Gutta Percha Company. From 20 to 60 tons were now regularly imported every month. Contrary to the general opinion that gutta percha is a simple, hydrogenous substance, Mr. Crane (chemist to the Gutta Percha Company) found it in its ordinary state to consist of at least two distinct materials, besides a notable proportion of sulphur—viz. 1. A white matter, gutta percha in its pure state; 2. A substance of a dark brown color. Various experiments were made to ascertain its strength when mixed with other matters, and also as to what pigments would mix with it without rendering it brittle or deteriorating its qualities. From these it appeared that the only pigments that could altogether be relied on to use with gutta percha were orange lead, rose pink, red lead, vermilion, Dutch pink, yellow ochre, and orange chrome. Under the influence of heat and pressure, gutta percha would spread to a certain extent, and more so if mixed with foreign matters. All the mixtures composed of gutta percha and other substances which had been subjected to experiment, except that containing plumbago, were found to increase its power of conducting heat; but in its pure state, gutta percha was an excellent non-conductor of electricity. The best composition for increasing the pliability of gutta percha was that formed in conjunction with caoutchouc tar, and next in order that of its own tar; and the best material at present known for moulding and embodying was obtained by mixing gutta percha with its own tar and lamp-black. In describing the process of manufacturing gutta percha the author observed that rude blocks of the material were first cut into slices, by means of a cutting machine formed of a circular iron plate of about five feet in diameter, in which there are three radical slots furnished with as many knives or blades. The blocks are placed in an inclined shoot, so as to present one end to the operation of the cutters. The slices are then placed in a wooden tank, containing hot water, in which they are left to soak until found in a plastic state. They are afterwards passed through a mincing cylinder, similar to that used in paper mills for the conversion of rags into pulp, and then thoroughly cleansed in cold water tanks; the water, in cases of impure gutta percha, being mixed with a solution of common soda or chloride of lime. It is next put into a masticating machine, such as is used in the manu-

facture of caoutchouc, and then pressed through rollers; thus being converted into sheets of various width and thickness. When necessary, the sheets are again masticated, and again passed through rollers. These sheets are subsequently cut into boards by vertical knives, placed at the further end of the table, along which the sheets are carried by a cloth or web to another roller, round which they pass and are cut into the required widths. The bands or straps are then removed, and coiled up ready for use. Driving bands for machinery are thus made, and shoe soles and heels are stamped out of similar sheets of gutta percha. In making tubes or pipes, of gutta percha or any of its compounds, a mass of gutta percha, after being thoroughly masticated, is placed in a metal cylinder furnished with a similar piston, by which it is pressed down into an air-box, kept hot with steam, which has at its lower end a number of perforations, through which the plastic material is forced into a cup, whence it passes out, round a core, into the desired tubular form, and thence through a gauge to the required size, and into a receiver of cold water, being drawn to the other end of a long trough by a cord passing round a pulley at the far end of the trough, and returning to the person in attendance on the machine, who gradually draws the pipe away from the air machine. Thus tubes of considerable length and diameter are made to a very great extent, and are used for the conveyance of water and other liquids, and are now under test for the conveyance of gas. The paper next explained the variety of articles already made of gutta percha, which were of three classes—1. Useful; 2. Ornamental; and 3. Useful and Ornamental combined. Various articles were then exhibited, including two very handsome shields, and a splendid Communion Dish and Service. Mr. Whishaw next exhibited the Telakouphanon, or Speaking Trumpet; and in doing so, said that speaking tubes of gutta percha were quite new, as was also the means of calling attention by them of the person at a distance, which was accomplished by the insertion of a whistle, which, being blown, sounded at the other end quite shrilly. Attention having been thus obtained, you remove the whistle, and by simply whispering, the voice would be conveyed quite audibly for a distance of at least three quarters of a mile, and a conversation kept up. It must be obvious how useful these telegraphs must become in large manufactories: and indeed in private houses they might quite supersede the use of bells, as they were so very cheap, and by branch pipes could be conveyed to different rooms: and, indeed, if there were no electric telegraphs, they might, by a person being stationed at the end of each tube of three quarters of a mile, or a mile, be made most speedily to convey intelligence for any distance. In private houses the whistle need not be used, but a more musical sound could be produced. He then amused the auditors by causing the end of the tube, which was of the length of 100 feet, to be inserted into the mouth-piece of a flute held in a person's hand, regulated the notes, and placing his own mouth to the other end of the tube, "God save the Queen" was played at a distance of 100 feet from the person giving the flute breath. Turning to the Bishop of St. David's, he said that in the event of a clergyman having three livings, he might, by the aid of three of these tubes, preach the same sermon in three different churches at the same time. Mr. Whishaw also exhibited the gutta percha submarine rope or telegraph, which consisted of a tube, perforated with a series of small tubes, for the conveyance of telegraphic wire, and which, for the purpose of preventing its being acted upon by sea water or marine insects, was banded or braided round by a small rope, and its being perfectly air-tight would render it quite impervious to the atmosphere.

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